

# **ABSTRACT**

A barrier layer made of  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  ( $0 < x \leq 0.18$ ) is formed in a light-emitting semiconductor device using gallium nitride compound having a multi quantum-well (MQW) structure. By controlling a composition ratio  $x$  of aluminum (Al) or thickness of the barrier layer, luminous intensity of the device is improved.

An n-cladding layer made of  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  ( $0 < x \leq 0.06$ ) is formed in a light-emitting semiconductor device using gallium nitride compound. By controlling a composition ratio  $x$  of aluminum or thickness of the n-cladding layer, luminous intensity of the device is improved.

A p-type layer and an n-type layer are formed in a light-emitting semiconductor device using gallium nitride compound having a double-hetero junction structure. By controlling a ratio of a hole concentration of the p-type layer and an electron concentration of the n-type layer approximates to 1, luminous intensity of the device is improved.